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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.: 09/997,602
Filed: November 29, 2001
Inventor(s):
Lanzatella, et al.

Title: Methods, Function Data, and Systems to Represent a Storage Environment

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Examiner: Debbie M. Le
Group/Art Unit: 2168
Atty. Dkt. No: 5760-16700

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

B. Noël Kivlin
Printed Name

Signature

April 19, 2007
Date

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir/Madam:

Further to the Notice of Appeal filed on February 21, 2007, Appellants present this Appeal Brief. Appellants respectfully request that this appeal be considered by the Board of Patent Appeals and Interferences.

I. REAL PARTY IN INTEREST

The present application is owned by VERITAS Operating Corporation, the assignee of record, a corporation organized and existing under and by virtue of the laws of the State of Delaware, and having an office and place of business at 350 Ellis Street, Mountain View, California 94043. VERITAS Operating Corporation is a subsidiary of Symantec Corporation, a corporation organized and existing under and by virtue of the laws of the State of Delaware, and now having its principal place of business at 20330 Stevens Creek Boulevard, Cupertino, California 95014.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee which will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1 – 26 are pending. Claims 1 – 26 are rejected, and the rejection of these claims is being appealed. A copy of claims 1 – 26 is included in the Claims Appendix attached hereto.

IV. STATUS OF AMENDMENTS

No amendments to the claims have been submitted subsequent to the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed toward a method to map a storage environment data object. The method comprises receiving a reference to the data object in a first storage environment, wherein the data object resides in a second storage environment, and generating a first data structure from the reference representing one or more physical locations of the data object within the second storage environment. In addition, the method comprises associating a signature with the data object, wherein the signature is indicative of a state of the data object, and retaining the first data structure in the first storage environment. The method also comprises updating the signature to reflect a change in the state of the data object, wherein a determination to update the signature is performed in the second storage environment. The method further comprises querying the second storage environment for a change to the signature in preparation for a data access operation on the data object, and updating the first data structure if the signature has changed. The method also includes performing the data access operation using the first data structure to interface with one or more of the physical locations of the data object from the first storage environment. *See, e.g.*, Fig. 1, Fig. 2, Fig. 3 and Fig. 5; page 8, lines 15 – 30; page 9, lines 15 - 30; page 10, lines 16 – 30; and page 12, line 3 – page 13, line 6.

Independent claim 9 is directed to a method to represent a data storage object. The method includes identifying one or more storage locations for the data storage object housed within a first storage environment and assembling a hierarchical map representing a path to one or more of the storage locations. The method also includes associating a signature with the map indicative of a state of the data storage object and querying the signature for changes in preparation for a data access operation on the data storage object. The method further comprises updating the map if the signature has changed, and using the map in a second storage environment to access the data object. *See, e.g.*, Fig. 1, Fig. 3, Fig. 4 and Fig. 5; page 8, lines 15 – 30; page 9, lines 1 - 14; page 10, lines 16 – 30; and page 14, line 11 – page 15, line 14.

Independent claim 15 is directed towards a first computer readable storage medium having a data map and a signature representing a data object residing on a second computer readable storage medium, wherein the signature is indicative of a state of the data object. The map comprises a plurality of nodes, including a first node representing the data object, a file system node representing a file system on the second computer readable storage medium, a volume node representing a volume manager associated with the file system, one or more partition nodes managed by the volume manager, and one or more disk identifications representing one or more storage devices housing the data object. The map is updated when a change to the signature is detected. *See, e.g.,* Fig. 4 and Fig. 5; page 7, line 13 – page 8, line 7; page 10, lines 16 – 30; and page 15, line 19 – page 17 line 24.

Independent claim 21 is directed to a storage environment system. The storage environment system comprises at least one storage device, a first file system, and a second file system. The first and second file systems are stored on the at least one storage device. One or more data objects residing in the second file system are capable of being referenced within the first file system. The system also includes a map and a signature. The map is generated to represent one or more physical locations for each of the one or more data objects and used by the first file system when one or more of the data objects are referenced. The one or more physical locations comprise one or more locations on the at least one storage device. The signature indicates a state of the one or more data objects. The map is updated when changes are detected and associated with the signature. *See, e.g.,* Fig. 1 and Fig. 5, page 10, lines 16 – 30; and page 18, lines 1 – 22.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1 – 25 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Tamer et al. (U.S. Patent No. 6,938,059, hereinafter "Tamer").

2. Claim 26 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Tamer in view of Agarwalla (U.S. Application No. 2003/0061278).

VII. ARGUMENT

First Ground of Rejection:

Claims 1 – 25 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Tamer et al. (U.S. Patent No. 6,938,059, hereinafter "Tamer"). Appellants traverse this rejection for the following reasons.

Claims 1 – 8:

Appellants respectfully submit that Tamer does not teach or suggest a method comprising "updating the signature to reflect a change in the state of the data object, wherein a determination to update the signature is performed in the second storage environment" in combination with the remaining features of claim 1. The Final Office Action asserts that Tamer's host computer mapping layer 220 and physical space 230 are respectively equivalent to Applicant's first storage environment and second storage environment. The Final Office Action cites col. 4, lines 46 – 64 and Fig. 10 of Tamer as teaching metadata 320 which is asserted to be equivalent to Applicant's signature indicative of a state of the data object. However, in the cited passage and throughout Tamer, there is no teaching or suggestion that a determination to update the metadata 320 (stored at the host computer) is performed in the second storage environment (i.e., as argued by the Final Office Action, Tamer's physical space 230). The Final Office Action also cites col. 17, lines 5 – 60 of Tamer as disclosing an intelligent storage device 740 capable of performing an additional mapping between the mapping layer 220 and the physical space 230. Again, however, there is no teaching or suggestion in Tamer that a determination to update the metadata 320 stored at the host computer is performed in the second storage environment (i.e., as argued by the Final Office Action, Tamer's physical space 230) of the intelligent storage device 740.

Furthermore, Appellants respectfully submit that Tamer does not teach or suggest a method comprising "querying the second storage environment for a change to the

signature in preparation for a data access operation on the data object" in combination with the remaining features of claim 1. In addressing this limitation of claim 1, the Final Office Action cites col. 22, line 44 through col. 23, line 13 and Fig. 12 of Tamer. At the cited locations, Tamer discloses querying a storage device for internal structure information, such as the mapping of a logical volume address to the corresponding physical blocks on the storage device. However, this internal structure information does not relate to a signature which was associated with a data object and which is indicative of a state of the data object. This internal structure information does not relate to Tamer's metadata 320, maintained at the host computer, which is asserted by the Final Office Action to be equivalent to the signature of Appellants' claim 1. Additionally, this internal structure information does not relate to a change in such a signature.

Appellants also respectfully submit that Tamer does not teach or suggest a method comprising "updating the first data structure if the signature has changed" in combination with the remaining features of claim 1. In addressing this limitation of claim 1, the Final Office Action cites col. 14, lines 10 – 29 and 33 – 38 of Tamer. However, in the cited passages, Tamer discloses updating the number of mapping layers (lines 10 – 29) or adding a new mapping layer (lines 33 – 38). Tamer does not teach or suggest updating a first data structure which represents one or more physical locations of the data object within the second storage environment, nor does Tamer teach or suggest updating the first data structure if a signature indicative of a state of the data object has changed.

Anticipation requires the presence of each and every limitation of the claimed invention, arranged as in the claim, in a single prior art reference. M.P.E.P 2131; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984). The identical invention must be shown in as complete detail as is contained in the claims. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). As discussed above, Tamer fails to disclose a method comprising "updating the signature to reflect a change in the state of the data object, wherein a determination to update the signature is performed in the second storage environment," "querying the second storage environment for a change to the signature in preparation for a data access

operation on the data object," or "updating the first data structure if the signature has changed" in combination with the remaining features of claim 1. Therefore, Tamer cannot be said to anticipate claim 1.

Accordingly, claim 1 and its dependent claims 2 – 8 are believed to patentably distinguish over Tamer for at least the reasons given above.

Claims 9 – 14:

Appellants respectfully submit that Tamer does not teach or suggest a method comprising "querying the signature for changes in preparation for a data access operation on the data storage object" in combination with the remaining features of claim 9. In addressing this limitation of claim 9, the Final Office Action cites col. 22, line 44 through col. 23, line 13 and Fig. 12 of Tamer. At the cited locations, Tamer discloses querying a storage device for internal structure information, such as the mapping of a logical volume address to the corresponding physical blocks on the storage device. However, this internal structure information does not relate to a signature indicative of a state of a data storage object. Additionally, this internal structure information does not relate to changes in such a signature.

Appellants also respectfully submit that Tamer does not teach or suggest a method comprising "updating the map if the signature has changed" in combination with the remaining features of claim 9. In addressing this limitation of claim 9, the Final Office Action cites col. 14, lines 10 – 29 and 33 – 38 of Tamer. However, in the cited passages, Tamer discloses updating the number of mapping layers (lines 10 – 29) or adding a new mapping layer (lines 33 – 38). Tamer does not teach or suggest updating the map itself, the map representing a path to one or more of the storage locations a the data storage object, nor does Tamer teach or suggest updating the map if a signature indicative of a state of the data storage object has changed.

Accordingly, claim 9 and its dependent claims 10 – 14 are believed to patentably distinguish over Tamer for at least the reasons given above.

Claims 15 – 25:

Appellants respectfully submit that Tamer does not teach or suggest a first computer readable storage medium having a data map and a signature, "wherein the map is updated when a change to the signature is detected" in combination with the remaining features of claim 15. In addressing this limitation of claim 15, the Final Office Action cites col. 14, lines 10 – 29 and 33 – 38 of Tamer. However, in the cited passages, Tamer discloses updating the number of mapping layers (lines 10 – 29) or adding a new mapping layer (lines 33 – 38). Tamer does not teach or suggest updating the map itself when a change to a signature indicative of a state of the data object is detected.

Accordingly, claim 15 and its dependent claims 16 – 20 are believed to patentably distinguish over Tamer for at least the reasons given above. Claim 21 and its dependent claims 22 – 25 are also believed to patentably distinguish over Tamer for similar reasons.

Second Ground of Rejection:

Claim 26 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Tamer in view of Agarwalla (U.S. Application No. 2003/0061278). Appellants traverse this rejection for the following reasons. Claim 26 depends on claim 1 and is therefore believed to patentably distinguish over the art cited by the Final Office Action for the reasons given above with respect to claim 1. Appellants therefore submit that the rejection of claim 26 is not supported by the cited art.

For the foregoing reasons, it is submitted that the Examiner's rejection of claims 1 – 26 was erroneous, and reversal of the decision is respectfully requested.

An appeal brief fee of $500 was previously charged for the Appeal Brief filed on February 21, 2006. Appellants request that the previous appeal brief fee be applied to the current Appeal Brief. If any additional fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5760-16700/BNK. This Appeal Brief is submitted with a return receipt postcard.

Respectfully submitted,

B. Noël Kivlin
Reg. No. 33,929
ATTORNEY FOR APPLICANTS

Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C.
P.O. Box 398
Austin, TX 78767-0398
Phone: (512) 853-8800
Date: April 19, 2007

VIII. CLAIMS APPENDIX

The claims on appeal are as follows.

1. A method to map a storage environment data object, comprising:

receiving a reference to the data object in a first storage environment, wherein the data object resides in a second storage environment;

generating a first data structure from the reference representing one or more physical locations of the data object within the second storage environment;

associating a signature with the data object, wherein the signature is indicative of a state of the data object;

retaining the first data structure in the first storage environment;

updating the signature to reflect a change in the state of the data object, wherein a determination to update the signature is performed in the second storage environment;

querying the second storage environment for a change to the signature in preparation for a data access operation on the data object;

updating the first data structure if the signature has changed; and

performing the data access operation using the first data structure to interface with one or more of the physical locations of the data object from the first storage environment.

2. The method of claim 1, wherein in retaining the first data structure one or more additional references access the data object using the first data structure.

3. The method of claim 1, wherein receiving the reference an operating system of the first storage environment does not support the second storage environment.

4. The method of claim 1, wherein during generation one or more extents of the data object within the second storage environment are provided.

5. The method of claim 4, wherein the generation further includes detecting a mirroring of the data object on at least two storage devices within the second storage environment.

6. The method of claim 1, wherein during generation metadata associated with the second storage environment and the data object are provided.

7. The method of claim 1, wherein in retaining the first data structure the first data structure is validated with one or more subsequent references made to access the data object.

8. The method of claim 1, wherein the method is used to interface a first database using the first storage environment with a second database using the second storage environment.

9. A method to represent a data storage object, comprising:

identifying one or more storage locations for the data storage object housed within a first storage environment;

assembling a hierarchical map representing a path to one or more of the storage locations;

associating a signature with the map indicative of a state of the data storage object;

querying the signature for changes in preparation for a data access operation on the data storage object;

updating the map if the signature has changed; and

using the map in a second storage environment to access the data storage object.

10. The method of claim 9, wherein while assembling the map attribute data are acquired and associated with the first storage environment.

11. The method of claim 10, wherein assembling further includes acquiring attribute data associated with the data storage object.

12. The method of claim 9, wherein in identifying one or more of the storage locations, the data storage object is identified as at least one of a file system, a file, a database, a volume, and a portion of data within a file.

13. The method of claim 9, wherein the method is repetitively processed for one or more additional data objects residing in the first storage environment.

14. The method of claim 13, wherein the method is used to create an image or copy of the first storage environment in the second storage environment.

15. A first computer readable storage medium having a data map and a signature representing a data object residing on a second computer readable storage medium, wherein the signature is indicative of a state of the data object, the map comprising:

a first node representing the data object;

a file system node representing a file system on the second computer readable storage medium;

a volume node representing a volume manager associated with the file system;

one or more partition nodes managed by the volume manager;

one or more disk identifications representing one or more storage devices housing the data object; and

wherein the map is updated when a change to the signature is detected.

16. The map of claim 15, wherein the map is represented as a tree data structure on the computer readable storage media.

17. The map of claim 15, wherein each node includes metadata.

18. The map of claim 15, wherein the map is used by an accessing set of executable instructions having access to a second file system which is incompatible with the first file system.

19. The map of claim 18, wherein the data object is referenced and modified by the accessing set of executable instructions from the second file system.

20. The map of claim 19, wherein the map is updated if one or more values associated with one or more of the nodes or identifications are modified.

21. A storage environment system, comprising:

at least one storage device;

a first file system stored on the at least one storage device;

a second file system stored on the at least one storage device;

one or more data objects residing in the second file system and capable of being referenced within the first file system;

a map generated to represent one or more physical locations for each of the one or more data objects and used by the first file system when one or more of the data objects are referenced, wherein the one or more physical locations comprise one or more locations on the at least one storage device; and

a signature indicative of a state of the one or more data objects;

wherein the map is updated when changes are detected and associated with the signature.

22. The system of claim 21, wherein the map is modified when one or more of the physical locations for each of the one or more data objects changes.

23. The system of claim 21, wherein the file systems reside in different computing environments.

24. The system of claim 23, wherein the file systems operate within different operating systems.

25. The system of claim 24, wherein the map is used to replicate the second file system within the first file system in a first file system format.

26. The method of claim 1, further comprising:

creating a portable representation of the data structure using extensible markup language (XML); and

distributing the portable representation to a third storage environment over the Internet.

IX. EVIDENCE APPENDIX

No evidence submitted under 37 CFR §§ 1.130, 1.131, or 1.132 or otherwise entered by the Examiner is relied upon in this appeal.

X. RELATED PROCEEDINGS APPENDIX

There are no related proceedings known to Appellants, Appellants' legal representatives, or assignee which will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.